

**Aura Validation Experiment
Science Flight #3 Summary Report
November 3, 2004**

Flight Objective:

Provide remote sensing observations of OMI, MLS and TES “step & stare” observational points. Acquire an extensive vertical profile for MLS validations purposes.

Flight Summary:

The flight on Wednesday, 3 November, coincided with an Aura track that came very close to Ellington Field. This enabled us to execute an aircraft flight plan that addressed validation objectives for each of the Aura instruments. The meteorological forecast called for a cloud system stretching from the Gulf of Mexico in the south, to Kansas in the north, with a significant stratospheric intrusion occurring over Oklahoma and Kansas, and a lowering of the tropopause to nearly 30 kft. The cloud heights gradually increased from 5 kft near Ellington Field to 30 kft in Kansas. Clear air was forecast northward of Kansas and provided an attractive coincidence point for the Aura overpass.

The aircraft took off at about 11:04 am CST (17:04 UTC) and headed north-west along the MLS observational track at an altitude of 45 kft. Along this route, the aircraft passed just to the east of the DOE ARM site at approximately 18:30 UTC, which was near in time to the daily 17:30 UTC ARM site launch of temperature and water vapor sondes. Upon entering southern Nebraska, the aircraft turned westward to intercept the satellite sub-orbital track and ascended to near 60 kft. Starting at approximately 19:35 UTC the aircraft began a 30 minute level flight segment heading south-east along the satellite sub-orbital track. As forecasted, the level flight segment occurred in nearly entirely clear air. The Aura satellite passed over the WB-57 at 19:53 UTC. Just prior to the satellite overpass a balloon ozonesonde was launched from Houston, Texas at 19:30 UTC. The balloon measurements were taken up to 37 kft altitude and have been submitted to the AVE data archive.

The aircraft changed heading at 20:05 UTC and returned to the MLS observational track whereupon it executed a downward spiral from 59 kft to 25 kft. Air traffic control issues precluded a desired upward spiral at the same location. Instead, the aircraft climbed to 53 kft and returned to Ellington airfield along the MLS observational track.

Preliminary analysis indicates that all instruments worked for most of the flight. Accordingly we expect that this flight will result in valuable comparisons between MLS, TES, OMI and the aircraft instruments.

Weather information is available in Figures 2-4.

Flight Profile (see Figure 1)

Takeoff: 11:07 CST

Landing: 16:28 CST

Duration: 5.4 hrs

Point 3: N29° 36', W95° 10'

Point 4: N40° 35', W98° 25'

Point 5: N41° 46', W100° 22'

Point 6: N40° 02', W99° 51'

Point 7: N38° 47', W990° 28'

Point 9: N38° 32', W97° 45'

Point 13: N32° 33', W95° 58'

Aircrew: Rick Hull, Pilot, and Dominic Del Rosso, Backseater

WB-57 Flight of 2004-11-03

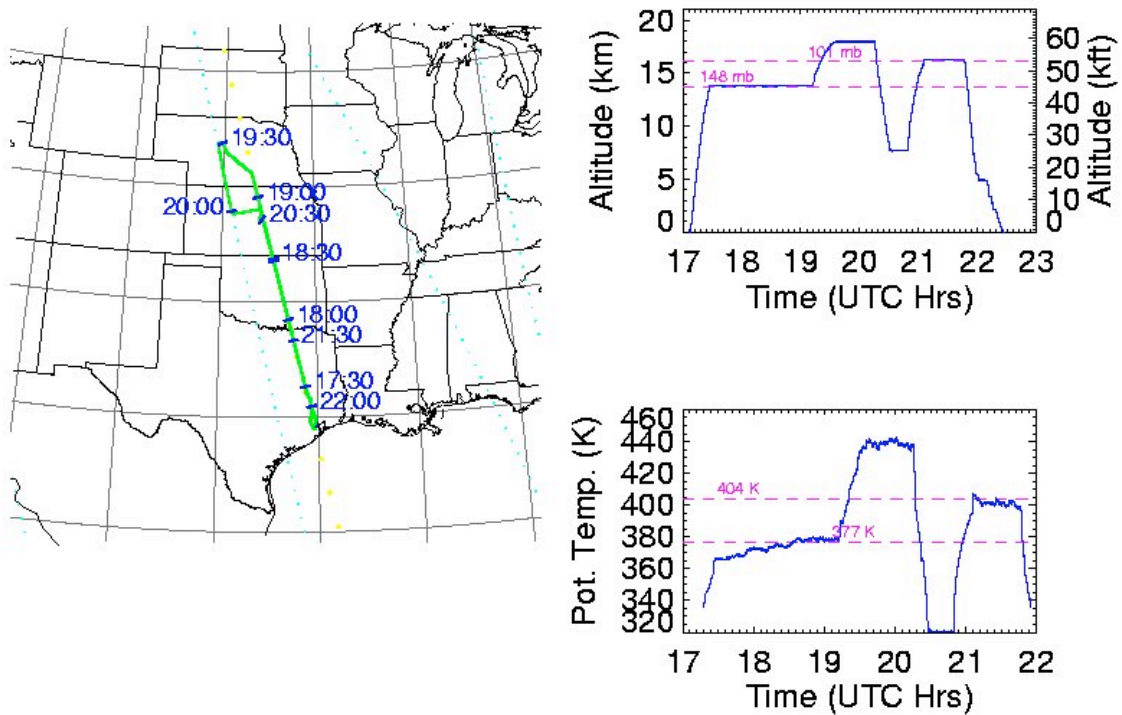


Figure 1 – Flight Profile

(Left) Map of WB-57F flight track (in green) with every half-hour marked. Aura nadir (faint cyan points) and MLS tracks (magenta points) are indicated.

(Upper Right) Plot of pressure altitude vs. time with the principal pressure levels of the flight marked.

(Lower Right) Plot of potential temperature vs. time with the principal theta levels of the flight marked.

18 UTC on 3 November, 2004 at 148.0 mb

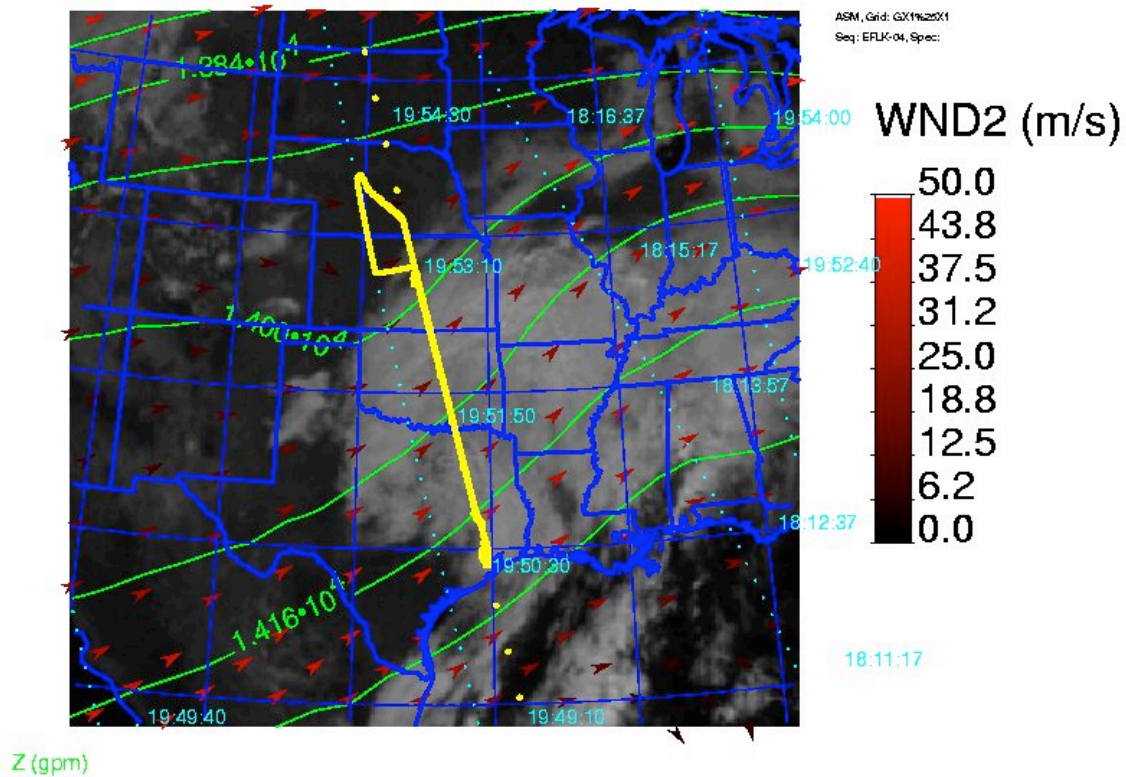


Figure 2 – GOES Visible Image

Flight track (yellow line) superimposed on meteorological fields. The grayscale image is the GOES-12 visible channel satellite image. The red arrows and green lines are the winds (WND2) and the geopotential heights (Z) at the principal pressure level at which the aircraft spent the most time. Values are from the GSFC GMAO assimilation analyses. The Aura nadir (cyan) and MLS tracks (magenta) are shown, with times along the ground track indicated.

18 UTC on 3 November, 2004 at -97.4 Longitude

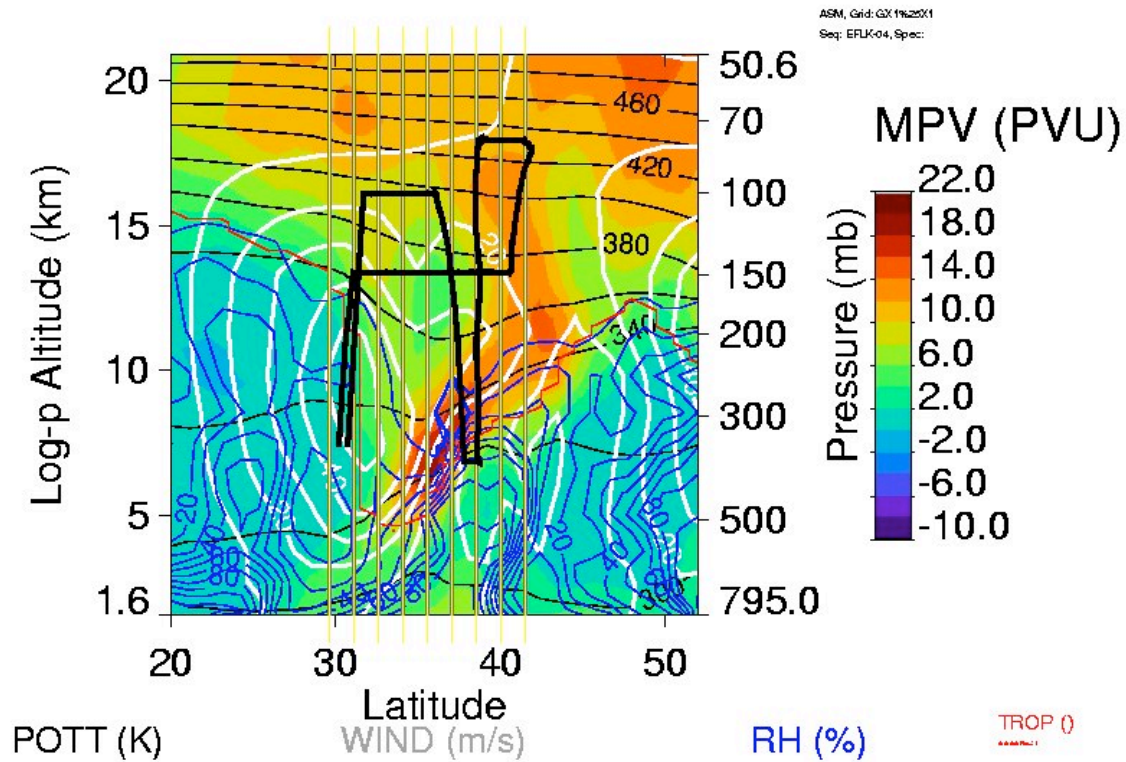


Figure 3 – Latitude Height Cross Section

Latitude-pressure cross-section of meteorological fields during the flight. The colored image represents modified potential vorticity (MPV); also shown are potential temperature (POTT) (thin black lines), wind speed (WIND) (white lines), relative humidity (RH) (blue lines), and the PV tropopause (TROP) (red line). The thick black lines mark the aircraft position and the vertical lines mark the positions of nearby MLS profiles.

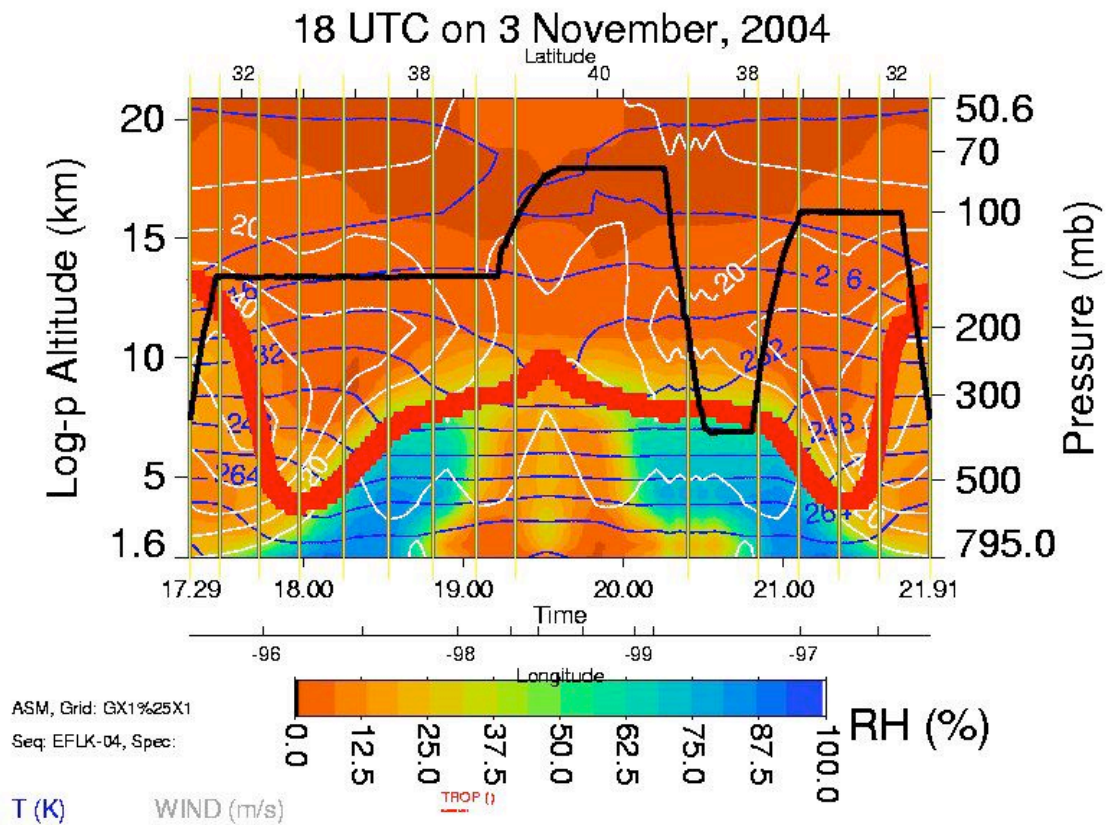


Figure 4 – Curtain Plot

Time-pressure "curtain" plot of meteorological vertical profiles along the flight track. The colored image represents relative humidity; also shown are temperature (T) (blue lines), wind speed (WIND) (white lines), and the PV tropopause (TROP) (red line). The thick black lines mark the aircraft position and the vertical lines mark the positions of nearby MLS profiles.